



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRAFT PERMIT November 19, 2021
TO WITHDRAW GROUNDWATER IN THE
EASTERN SHORE GROUNDWATER MANAGEMENT AREA

Permit Number: GW0068701

Effective Date: XXXXXXXX XX, 202X

Expiration Date: XXXXXXXX XX, 203X

Pursuant to the Ground Water Management Act of 1992 (Section 62.1-254 et seq. of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610-10), the State Water Control Board (Board) hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee Mount Warren Farms, LLC

Facility Mount Warren Farm

Facility Address 6507 Seaside Rd.

Exmore, VA 23350

The Permittee's authorized groundwater withdrawal shall not exceed:

179,500,000 gallons for the permit term,
17,900,000 gallons per year,
6,600,000 gallons per month

The permitted withdrawal will be used to provide a withdrawal for agricultural irrigation for tomato production. Other uses are not authorized by this permit.

The Permittee shall comply with all conditions and requirements of the permit.

By direction of the State Water Control Board, this Permit is granted by:

Signed _____

Date _____

Director, Office of Water Supply

This permit is based on the Permittee's application submitted on July 31, 2018, and subsequently amended to include supplemental information provided by the Permittee. The following are conditions that govern the system set-up and operation, monitoring, reporting, and recordkeeping pertinent to the Regulations.

Part I Operating Conditions

A. Authorized Withdrawal

1. The withdrawal of groundwater shall be limited to the following wells identified in the table below. Withdrawals from wells not included in Table 1 are not authorized by this permit and are therefore prohibited. 9VAC25-610-140 A

Table 1

Owner Well Name	DEQ Well #	Well Depth (ft/bls)	Screen Intervals (ft/bls)	Aquifer	Latitude	Longitude	Datum
Well #1	165-00569	66.8	32-62	Columbia	37° 29' 16.730"	75° 50' 16.753"	NAD 83
Well #2	165-00570	50	35.5-50	Columbia	37° 29' 20.385"	75° 50' 11.635"	NAD 83
Well #3	165-00571	56.2	28.7-56.2	Columbia	37° 29' 24.496"	75° 50' 11.635"	NAD 83

2. Any actions that result in a change to the status, construction, or pump intake setting of wells included in this permit must be pre-approved by the Department of Environmental Quality (Department) in writing prior to implementing the change and a revised GW-2 Form must be submitted to the Department within 30 days after the physical construction of a well is altered or the pump intake setting has been changed. If changes are a result of an emergency, notify the Department within 5 days from the change. 9VAC25-610-140 C

B. Pump Intake Settings

1. The Permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source in order to prevent dewatering of the aquifer, loss of inelastic storage, or damage to the aquifer from compaction. 9VAC25-610-140 A 6
2. Pump settings in individual wells are limited as follows. Any change in the pump setting must receive prior approval by the Department.

Owner Well Name	DEQ Well #	Max Pump Setting (feet below land surface)*
Well #1	165-00569	60
Well #2	165-00570	60
Well #3	165-00571	60

*DEQ estimated the base of the Columbia aquifer to be between 60-65 ft/bls based on the available well data from the 2018 camera surveys. Prior to reapplication a geophysical borehole will be required to make this determination.

C. Reporting

1. Water withdrawn from each well shall be recorded monthly at the end of each month and reported to the Office of Water Supply, in paper or electronic format, on a form provided by the Department by the tenth (10th) day of each January, April, July and October for the respective previous calendar quarter. Records of water use shall be maintained by the Permittee in accordance with Part III.F, 1 through 5 of this permit. 9VAC25-610-140 A 9
2. The Permittee shall report any amount in excess of the permitted withdrawal limit by the fifth (5th) day of the month following the month when such a withdrawal occurred. Failure to report may result in compliance or enforcement activities. 9VAC25-610-140 C
3. The following is a summary of reporting requirements for specific facility wells:

Owner Well Name	DEQ Well #	Reporting Requirements
Well #1	165-00569	Water Use
Well #2	165-00570	Water Use
Well #3	165-00571	Water Use

D. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the application received July 31, 2018 and subsequently amended and then approved by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such.
2. By the end of the first year of the permit cycle [MMDD 2022] the Permittee shall submit documentation to the Department that the leak detection and repair program defined in the WCMP has been initiated. This documentation shall include activities completed during the first year of the permit term. 9VAC25-610-100 B
3. As soon as completed but not later than the end of the second year of the permit cycle [MMDD 2023] the Permittee shall submit to the Department results of an audit of the total amount of groundwater used in the distribution system and operational processes. This documentation shall include any resulting changes to the leak detection and repair program in the WCMP. 9VAC25-610-100 B
4. A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [MM DD 2026] and ten [MM DD 2031] of the permit term. These reports shall include as appropriate: 9VAC25-610-140 C
 - a. Water-saving plumbing and processes to decrease the amount of water withdrawn or to decrease water demand, including the specific types(s) of irrigation systems in place, irrigation schedules used to minimize water demand, and crop watering requirements;
 - b. Any new water saving equipment installed or water saving processes adopted should be described;

- c. A status update on the success of the water loss reduction program and status of the leak detection and repair program based on the results of the water audit, including a description of actions taken to reduce the volume of water needed to supply the system;
 - d. The water use education program, including any revisions or improvements made to employee training on water conservation in relation to the irrigation management plan;
 - e. An evaluation of current potential water reuse options, including the potential for expansion of existing reuse practices and/or adoption of additional reuse practices;
 - f. Requirements for mandatory water use reductions during water shortage emergencies and compliance with drought response and contingency ordinances or other ordinances that prohibit the use of water; and
 - g. Any portions of agricultural or irrigation management plans developed to demonstrate compliance with the above items.
5. If revisions or additions to the plan are necessary, an updated WCMP shall be submitted to the Department for approval along with the report prior to implementation of the revised plan
 6. Records of activities conducted pursuant to the WCMP are to be submitted to DEQ upon request.

E. Mitigation Plan

The Mitigation Plan approved on October 29, 2020 by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such. 9VAC25-610-110 D 3 g

F. Well Tags

1. Each well that is included in this permit shall have affixed to the well casing, in a prominent place, a permanent well identification plate that records, at a minimum, the DEQ well identification number, the groundwater withdrawal permit number, the total depth of the well, and the screened intervals in the well. Such well identification plates shall be in a format specified by the Board and are available from the Department. 9VAC25-610-140 A 12
2. Well tags shall be affixed to the appropriate well casing within 30 days of receiving the tags from the Department. The accompanying well tag installation certification form shall be returned to the Department within 60 days of receipt of the tags. 9VAC25-610-140 C

Part II Special Conditions

Pursuant to 9VAC25-610-140 B and C, the following Special Conditions apply to this permit in order to protect the public welfare, safety, and health or conserve, protect and help ensure the beneficial use of groundwater.

A. Pump Intake Setting

Prior to initiating withdrawal from any wells on-site, documentation must be sent to DEQ noting the pump intake setting and date of installation. All well pumps must be set in accordance with 9VAC25-610-140 A 6 and Part I Operating Condition B 2

Part III General Conditions

A. Duty to Comply

The Permittee shall comply with all conditions of the permit. Nothing in this permit shall be construed to relieve the permit holder of the duty to comply with all applicable federal and state statutes, regulations and prohibitions. Any permit violation is a violation of the law and is grounds for enforcement action, permit termination, revocation, modification, or denial of a permit application. 9VAC25-610-130 A

B. Duty to Cease or Confine Activity

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the activity for which a permit has been granted in order to maintain compliance with the conditions of the permit. 9VAC25-610-130 B

C. Duty to Mitigate

The Permittee shall take all reasonable steps to avoid all adverse impacts that may result from this withdrawal as defined in 9VAC25-610-10 and provide mitigation of the adverse impact when necessary as described in 9VAC25-610-110 D 3 g and 9VAC25-610-130 C.

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the Board, the Department, or any duly authorized agent of the Board, at reasonable times and under reasonable circumstances, to enter upon the Permittee's property, public or private, and have access to, inspect and copy any records that must be kept as part of the permit conditions, and to inspect any facilities, well(s), water supply system, operations, or practices (including sampling, monitoring and withdrawal) regulated or required under the permit. For the purpose of this section, the time for inspection shall be deemed reasonable during regular business hours. Nothing contained herein shall make an inspection time unreasonable during an emergency. 9VAC25-610-130 D

E. Duty to Provide Information

The Permittee shall furnish to the Board or Department, within a reasonable time, any information that the Board may request to determine whether cause exists for modifying or revoking, reissuing, or

terminating the permit, or to determine compliance with the permit. The Permittee shall also furnish to the Board or Department, upon request, copies of records required to be kept by regulation or this permit. 9VAC25-610-130 E

F. Monitoring and Records Requirements

1. The Permittee shall maintain a copy of the permit on-site and/or shall make the permit available upon request. 9VAC25-610-130 E
2. Monitoring of parameters shall be conducted according to approved analytical methods as specified in the permit. 9VAC25-610-130 F 1
3. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. 9VAC25-610-130 F 2
4. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart or electronic recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three years from the date of the expiration of a granted permit. This period may be extended by request of the Board at any time. 9VAC25-610-130 F 3
5. Records of monitoring information shall include as appropriate: 9VAC25-610-130 F 4
 - a. the date, exact place and time of sampling or measurements;
 - b. the name(s) of the individual(s) who performed the sampling or measurements;
 - c. the date the analyses were performed;
 - d. the name(s) of the individual(s) who performed the analyses;
 - e. the analytical techniques or methods supporting the information, such as observations, readings, calculations and bench data used;
 - f. the results of such analyses; and
 - g. chain of custody documentation.

G. Environmental Laboratory Certification

The Permittee shall comply with the requirement for certification of laboratories conducting any tests, analyses, measurements, or monitoring required pursuant to the State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia), Environmental Laboratory Certification Program (§ 2.2-1105 et seq. of the Code of Virginia), Certification for Noncommercial Environmental Laboratories (1VAC30-45), and/or Accreditation for Commercial Environmental Laboratories (1VAC30-46), and

1. Ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
2. Conduct monitoring according to procedures approved under 40CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency.
3. Periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements. 1VAC30-45-20

H. Future Permitting Actions

1. A permit may be modified or revoked as set forth in Part VI of the Groundwater Withdrawal Regulations. 9VAC25-610-290 and 9VAC25-610-130 G
2. If a Permittee files a request for permit modification or revocation, or files a notification of planned changes, or anticipated noncompliance, the permit terms and conditions shall remain effective until the Board makes a final case decision. This provision shall not be used to extend the expiration date of the effective permit. 9VAC25-610-130 G
3. Permits may be modified or revoked upon the request of the Permittee, or upon Board initiative, to reflect the requirements of any changes in the statutes or regulations. 9VAC25-610-130 G
4. The Permittee shall schedule a meeting with the Department prior to submitting a new, expanded or modified permit application. 9VAC25-610-85
5. A new permit application shall be submitted 270 days prior to the expiration date of this permit, unless permission for a later date has been granted by the Board, to continue a withdrawal greater than or equal to 300,000 gallons in any month while an application for a renewal is being processed. 9VAC25-610-96
6. A new permit application shall be submitted 270 days prior to any proposed modification to this permit that will (i) result in an increase of withdrawal above permitted limits; or (ii) violate the terms and conditions of this permit. 9VAC25-610-96
7. The applicant shall provide all information described in 9VAC25-610-94 for any reapplication. 9VAC25-610-96 C
8. The Permittee must notify the Department in writing of any changes to owner and facility contact information within 30 days of the change. 9VAC25-610-140 C

I. Metering and Equipment Requirements

1. Each well and/or impoundment or impoundment system shall have an in-line totalizing flow meter to read gallons, cubic feet, or cubic meters installed prior to beginning the permitted use. Meters shall produce volume determinations within plus or minus 10% of actual flows. 9VAC25-610-140 A 7 b
 - a. A defective meter or other device must be repaired or replaced within 30 days.

- b. A defective meter is not grounds for not reporting withdrawals. During any period when a meter is defective, generally accepted engineering methods shall be used to estimate withdrawals. The period during which the meter was defective must be clearly identified in the groundwater withdrawal report required by Part I, Subsection D of this permit. An alternative method for determining flow may be approved by the Board on a case-by-case basis.
2. Each well shall be equipped in a manner such that water levels can be measured during pumping and non-pumping periods without dismantling any equipment. Any opening for tape measurement of water levels shall have an inside diameter of at least 0.5 inches and be sealed by a removable plug or cap. The Permittee shall provide a tap for taking raw water samples from each permitted well. 9VAC25-610-140 A 7 e

J. Minor Modifications

1. A minor modification to this permit must be made to replace an existing well(s) or add an additional well(s) provided that the well(s) is screened in the same aquifer(s) as the existing well(s), and is in the near vicinity of the existing well(s), the total groundwater withdrawal does not increase, the area of impact does not increase, and the well has been approved by the Department prior to construction. 9VAC25-610-330 B 4 and B 5
2. A minor modification to this permit must be made to combine withdrawals governed by multiple permits when the systems are physically connected as long as interconnection will not result in additional groundwater withdrawal and the area of impact will not increase. 9VAC25-610-330 B 6
3. Minor modifications to this permit must also be made to:
 - a. Change an interim compliance date up to 120 days from the original compliance date, as long as the change does not interfere with the final compliance date. 9VAC25-610-330 B 7
 - b. Allow for change in ownership when the Board determines no other change in the permit is necessary and the appropriate written agreements are provided in accordance with the transferability of permits and special exceptions. 9VAC25-610-320 and 9VAC25-610-330 B 8
 - c. Revise a Water Conservation and Management Plan to update conservation measures being implemented by the Permittee that increase the amount of groundwater conserved. 9VAC25-610-330 B 9

K. Well Construction

At least two weeks prior to the scheduled construction of any well(s), the Permittee shall notify the Department of the construction timetable and receive prior approval of the well(s) location(s) and acquire the DEQ Well number. All wells shall be constructed in accordance with the following requirements.

1. A well site approval letter or well construction permit must be obtained from the Virginia Department of Health prior to construction of the well. 9VAC25-610-130 A

2. A complete suite of geophysical logs (16"/64" Normal, Single Point, Self-Potential, Lateral, and Natural Gamma) shall be completed for the well and submitted to the Department along with the corresponding completion report. 9VAC25-610-140 C
3. The Permittee shall evaluate the geophysical log and driller's log information to estimate the top of the target aquifer and; therefore, a depth below which the pump shall not be set. The Permittee's determination of the top of the target aquifer shall be submitted to the Department for review and approval, or approved on site by the Department's Groundwater Characterization staff, prior to installation of any pump. 9VAC25-610-140 A 6
4. The Permittee shall install gravel packs and grout in a manner that prevents leakance between aquifers. Gravel pack shall be terminated close to the top of the well screen(s) and shall not extend above the top of the target aquifer. 9VAC25-610-140 C
5. A completed GW-2 Form and any additional water well construction documents shall be submitted to the Department within 30 days of the completion of any well and prior to the initiation of any withdrawal from the well. The assigned DEQ Well number shall be included on all well documents. 9VAC25-610-140 C
6. In addition to the above requirements, if required by the permit, construction of a Water Level Monitoring State Observation Well (SOW) requires:
 - a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C
 - b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C
 - c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the installation of the transducer and final hook-up of the equipment. 9VAC25-610-140 C
7. In addition to the above requirements, if required by the permit, construction of a Chloride Monitoring SOW requires:
 - a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C

- b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C
- c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct final hook-up of the equipment. 9VAC25-610-140 C
- d. Instrumentation to meet the requirements for continuous measurement of specific conductance from multiple levels within the well screen shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the final hook-up of the equipment. 9VAC25-610-140 C

L. Permit Reopening

This permit may be reopened for the purpose of modifying the conditions of the permit as follows:

1. To meet new regulatory standards duly adopted by the Board. 9VAC25-610-140 A 11
2. When new information becomes available about the permitted withdrawal, or the impact of the withdrawal, which had not been available at permit issuance and would have justified the application of different conditions at the time of issuance. 9VAC25-610-310 B 1
3. When the reported withdrawal is less than 60% of the permitted withdrawal amount for a five year period. 9VAC25-610-310 B 2
4. If monitoring information indicates the potential for adverse impacts to groundwater quality or level due to this withdrawal. 9VAC25-610-140 C

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

DRAFT PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GW0068701

Application Date: July 31, 2018

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. Based on the information provided in the application and subsequent revisions, DEQ has determined that there is a reasonable assurance that the activity authorized by the permit is a beneficial use as defined by the regulations. Groundwater impacts have been minimized to the maximum extent practicable. The following details the application review process and summarizes relevant information for developing the Permit and applicable conditions.

Permittee / Legal Responsible Party

Name & Address: Mount Warren Farms, LLC
P.O. Box 12809
Norfolk, VA 23541
Phone: (757) 617-3317

Facility Name and Address

Name & Address: Mount Warren Farm
6507 Seaside Rd.
Exmore, VA 23350
Phone: (757) 617-3317

Contact Information:

Name: John Payne, Managing Member
E-mail: jwpayne49@gmail.com
Phone: (717) 617-3317

Proposed Beneficial Use: The proposed withdrawal is for agricultural irrigation for tomato production. Other beneficial uses are not authorized by this permit.

Processing Dates

Processing Action	Date Occurred/Received
Notification of Renewal:	Not Documented
Pre-Application Meeting:	July 17, 2018
Application Received by DEQ-OWS:	July 31, 2018
Permit Fee Deposited by Accounting:	No fee- agricultural
Application Review Conducted:	June 9, 2020
Notice of Deficiency Sent	None Sent
Request for Additional Information Sent:	September 30, 2020
Response to Request for Additional Information Received:	October 29, 2020
Local Government Ordinance Form Received by DEQ-OWS:	July 31, 2018
Updated Local Government Ordinance Form Received by DEQ-OWS:	August 17, 2020
Application Complete:	October 29, 2020
Submit Request for Technical Evaluation:	April 12, 2021
Technical Evaluation Received by DEQ-OWS:	April 28, 2021
Draft Permit Package Sent:	November 19, 2021
Submit Draft Permit for Public Notice:	Pending
Public Notice Published:	Pending
End of 30-Day Public Comment Period:	Pending
Response to Public comment:	Pending
Public Meeting or Hearing:	Pending

Application

Application Information

Description:

Background / Purpose of Facility

Mount Warren Farms LLC is applying for the reissuance of Groundwater Withdrawal Permit No. GW0068700 with modification for Mount Warren Farm. The previous permit (GW0068700) was a historic-based permit that Mount Warren Farms LLC accepted in the event that a future lease agreement would require a water source. At the time of the GW0068700 permit issuance, Mount Warren Farm was leased to a Mr. Benny Etheridge for soybean crop production. Mount Warren Farm will be transitioning from soybean to tomato crop production for the upcoming permit term. The current anticipated transition to tomato farming will occur during the spring of 2023.

Water will be withdrawn from three production wells on-site: Well #1 (DEQ Well ID No. 165-00569), Well #2 (DEQ Well ID No. 165-00570), and Well #3 (DEQ Well ID No. 165-00571). These production wells were listed as Out of Service under the previous permit, as a water withdrawal was not needed for the previous soybean crop. There are no other wells located on-site. During the last permit term, duplicate

well numbers were created for this facility. The original DEQ numbers for the three Mount Warren Farm wells were Well #1 (DEQ Well ID No. 165-00152), Well #2 (DEQ Well ID No. 165-00153), and Well #3 (DEQ Well ID No. 165-00154). Since the newer, duplicated set of numbers (165-00569, 165-00570, and 165-00571) was used in the last permit and technical evaluation and are currently representative of those wells on-site, they will continue to be used moving forward.

Location of Facility/Withdrawal:

Water Supply Planning Unit: Northampton County and Towns

County: Northampton

GWMA/Aquifer: Eastern Shore/Columbia aquifer

Conjunctive Use Source: No conjunctive use

Withdrawal Use, Current Need, and Projected Demand:Basis of Need:

Mount Warren Farm consists of 64.0 gross acres with a net acreage of 42.67 acres for crop production (the lessee intends to utilize all net acreage available for growing tomatoes). The irrigation system will utilize the plasticulture method with low-drop emitters. Each tomato crop is irrigated by underground drip hoses placed within raised soil mounds covered by plastic sheeting. Plastic mulch reduces water loss by allowing for soil temperature control, minimizing weed growth, and captures potential evaporation from the soil. Plasticulture techniques can reduce water use by 50-70% relative to overhead sprinkler irrigation systems. Tomatoes require a precise amount of water for optimal growth. The plant's health can be impacted by too much or too little water, so controlling the exact amount of irrigation is necessary for optimal crop production. Although each agricultural season is unique and may vary, the peak water demand occurs during the months of July through September of any given year. In addition to crop irrigation, the water withdrawal will also be used to fill overhead spray tanks and dilute herbicides and pesticides that are applied to the plants.

Water Demand and Projections:

Since this will be the first time tomatoes are grown at Mount Warren Farm, water withdrawal data from a comparable facility, Bowen Farm (GW0065600), was used to evaluate future water demand. Bowen Farm is owned by Kuzzens Inc. and located approximately 3.7 miles away from Mount Warren Farm. Historic withdrawal data from 2009-2015 was evaluated, and then projected onto the 42.67 net acres of farmable land at Mount Warren Farm. Bowen Farm used an average of 280,441 gallons per net acre, with a maximum of 418,154 gallons per net acre occurring in 2009. Its annual use for the time period analyzed ranged from a low of 15,965,000 gallons in 2013 (93.62 net acres farmed) to a high of 39,252,108 gallons in 2009 (93.87 net acres farmed). Their average annual use from 2009-2015 was 26,401,857 gallons per year, with an average of 94.07 acres farmed.

This withdrawal data was used to calculate the gallons per net acre used, then multiplying these amounts by the net acreage of Mount Warren Farm (42.67) in order to project the total number of gallons that would be needed by Mount Warren Farm in a given year. Data from the year 2009 was used to do this in order to accommodate conditions represented by the year of highest historic water demand. These calculations are shown in the table below:

Table 1: Mount Warren Farm Annual Use Projections (during a high water demand year)

Month	Net Acreage of Mount Warren Farm	Gallons per Net Acre (used by Bowen Farm in 2009)	Maximum Water Amount Required (gal)
January	42.67	11	467
February	42.67	322	13,754
March	42.67	430	18,327
April	42.67	13	554
May	42.67	13,526	577,130
June	42.67	19,870	847,793
July	42.67	83,831	3,576,787
August	42.67	106,639	4,549,938
September	42.67	145,083	6,190,212
October	42.67	48,420	2,065,926
November	42.67	8	345
December	42.67	0	0
Total:	42.67	418,154	17,841,000

As shown in Table 1, the total gallons per net acre used throughout the year 2009 was 418,154 gallons. This value multiplied by the net acreage of Mount Warren Farm (42.67) would equate to 17,841,000 gallons for that year. According to groundwater withdrawal reporting through January 2021, the year 2009 remains the year of highest water demand for Bowen Farm.

The monthly maximum was calculated by dividing projected net acreage by the acreage of the farm during the month of greatest usage, then multiplying that factor by the amount of water used in that month. The maximum monthly amount of water usage was August 2011 with 14,558,625 gallons used for 95.03 net acres. The projected acreage of Mount Warren Farm (42.67 acres) divided by the acreage used in the maximum water withdrawal month for Bowen Farm (95.03 acres) yields a value of 0.449. Multiplying the maximum number of gallons in a given month (14,558,625 gallons) by 0.449 yields the monthly maximum gallons for Mount Warren Farm as 6,537,000 gallons/month.

A lump sum method was proposed for this facility to allow for flexibility in water demand due to the agricultural season of any given year over the 15 year permit term. This was calculated by using the average gallons used per net acre from the 2009-2015 historic use data for Bowen Farm. The total gallons per net acre used for each year was multiplied by the Mount Warren Farm acreage (42.67 acres). Each of these values was multiplied by 15 years, and the average of these was taken. This data is presented in Table 2 below:

Table 2: Fifteen Year Lump Sum Calculations

Year	Net Acreage of Mount Warren Farm	Gallons per Net Acre (used by Bowen Farm)	Gallons per Net Acre x 15 Years
2009	42.67	418,154	267,618,506
2010	42.67	270,766	173,290,087
2011	42.67	313,398	200,574,667
2012	42.67	305,884	195,765,541
2013	42.67	170,530	109,139,073
2014	42.67	251,663	161,064,606
2015	42.67	232,693	148,923,341
Average:	42.67	280,441	179,482,000

As shown in Table 2, the fifteen year lump sum based on the average of gallons per net acre use projected onto Mount Warren Farm's net acreage is 179,482,000 gallons over the course of the permit term.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day
Maximum Monthly:	6,537,000	210,870
Maximum Annual:	17,841,000	48,879
Maximum Fifteen Year:	179,482,000	32,782

DEQ Evaluation

Historic Withdrawals:

Historic water withdrawals from a comparable tomato farm permitted by DEQ were used in order to evaluate the projected water demand for Mount Warren Farm. Withdrawal data from Bowen Farm (GW0065600) was used to calculate gallons per acre (maximum, annual, and average), maximum monthly and annual withdrawal requirements, and a fifteen year lump sum withdrawal requirements for Mount Warren Farm. This data originally presented upon application submission in 2018 was updated and checked in January 2021 to ensure that the maximum values presented in 2009-2015 were not surpassed and remained representative of current use. Details and calculations methods of these historic withdrawals can be found in the earlier "Water Demand and Projection" section of this fact sheet.

Analysis of Alternative Water Supplies:

There are two surface water sources near the facility location: Green Creek and Upshur Creek. However, these creeks were deemed to be unacceptable sources of irrigation water due to the water quality demands for tomato crop production, as they are intended for human consumption. The water quantity from these creeks will also likely be seasonal and/or transient, therefore not a reliable alternative for the water quantity demand for the facility, particularly in the warmer months of peak operational season. The closest public water supply system is located in the Town of Exmore, located approximately 1.5 miles away from the property. The Town of Exmore currently has a Groundwater Withdrawal Permit No. GW0038801, and the addition of Mount Warren Farm water demand would represent an approximate 29.4% increase to the Town's withdrawal. This public water supply option utilizes the Yorktown-Eastover aquifer, while the on-site wells are screened in the Columbia aquifer, which is a preferred, more sustainable option for crop irrigation purposes.

Public Water Supply: The proposed beneficial use does not contain a public water supply component.

Water Supply Plan Review: A Water Supply Planning review noted that the Northampton County and Towns Water Supply Plan (Plan) did not include Mount Warren Farm. The requested withdrawal was noted as appropriate given the estimated water use based on other tomato producers in the region. No other practicable alternatives were noted, and on-site wells are already using the preferred Columbia aquifer for irrigation purposes.

Department Recommended Withdrawal Limits:

The requested withdrawal limits were based on the historic data presented from the comparable facility that grows tomatoes (Bowen Farm; GW0065600) for years 2009-2015. The gallons per net acre calculated from this facility's data was then applied proportionally to the net acreage that Mount Warren Farm intends to utilize at full capacity. DEQ reviewed the data and methodology used in the application to determine the monthly, annual, and fifteen year lump-sum amounts as well future plans of operation for the facility. Each requested amount was rounded up to the nearest hundred-thousand amount in accordance with DEQ's April 6, 2015 "Rounding Memo", which resulted in the following recommended amounts: a maximum monthly withdrawal of 6,600,000 gal, a maximum annual withdrawal of 17,900,000 gal and a maximum fifteen year amount of 179,500,000 gal. Each of these limit increases were less than 1.0 %.

DEQ recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application.

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day
Maximum Monthly:	6,600,000	220,000
Maximum Annual:	17,900,000	49,041
Maximum Fifteen Year:	179,500,000	32,785

Technical Evaluation:

Aquaveo performed a technical evaluation of the application for the Department based on the VAHydroGW-ES model and Hantush and Jacob (1955) 2D analytical simulations. An aquifer test was not performed so properties from the model were used in the evaluation. The objectives of this evaluation were to determine the areas of any aquifers that will experience at least one foot of water level decline due to the proposed withdrawal (the Area of Impact or AOI), to determine the potential for the proposed withdrawal to cause salt-water intrusion, and to determine if the proposed withdrawal meets the 80% drawdown criteria.

The withdrawal requested by Mount Warren Farms, LLC for the Mount Warren Farm withdrawal satisfies the technical evaluation criteria for permit issuance. The full technical evaluation and AOI map is attached to this fact sheet as Attachment 1.

Part I
Operating Conditions

Authorized Withdrawals:

In anticipation of the future transition to tomato crop production and the upcoming permit reissuance (and to fulfill Part II, Special Condition #3 of GW0068700), camera surveys were conducted on all three wells in November 2018 in order to collect all necessary well construction information. According to the camera surveys, Well #1 is drilled to a depth of 66.8 ft/bls, Well #2 is infilled to a depth of 50 ft/bls, and Well #3 is drilled to a depth of 56.2 ft/bls. All three wells are screened in the Columbia aquifer. There are no other wells associated with the farm.

Owner Well Name	DEQ Well #	Aquifer	Type	Pump Intake Limit (ft. bls)*
Well #1	165-00569	Columbia	Production	60
Well #2	165-00570	Columbia	Production	60
Well #3	165-00571	Columbia	Production	60

*DEQ estimated the base of the Columbia aquifer to be between 60-65 ft/bls based on the available well data from the 2018 camera surveys. Prior to reapplication a geophysical borehole will be required to make this determination.

Apportionment:

The apportionment for Well #1 (DEQ Well ID No. 165-00569), Well #2 (DEQ Well ID No. 165-00570), and Well #3 (DEQ Well ID No. 165-00571) will be equally distributed.

Additional Wells:

Observation Wells: There are no observational wells associated with this facility.

Abandoned Wells: There are no abandoned wells associated with this facility.

Out of Service Wells: There are no longer out of service wells associated with this facility.

Pump Intake Settings: All production wells are currently out of service with no pumps installed.

Withdrawal Reporting: Groundwater withdrawals are to be recorded monthly and reported quarterly.

Water Conservation and Management Plan:

A Water Conservation and Management Plan (WCMP) meeting the requirements of 9VAC25-610-100 B was submitted and reviewed as part of the application process. The accepted Plan is to be followed by the permittee as an operational Plan for the facility/water system, is incorporated by reference into this permit, and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 2). In addition, the permit includes conditions requiring a leak detection and repair program that includes the following:

- Documentation that the leak detection and repair program defined in the WCMP has been initiated is due by the end of the first year of the permit term.
- A result of an audit of the total amount of groundwater used in the distribution system and operational processes is due by the end of the second year of the permit term.
- A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [MM DD 20XX] and ten [MM DD 20XX] of the permit term. These reports shall include as appropriate: 9VAC25-610-140 C
 - a. Water-saving plumbing and processes to decrease the amount of water withdrawn or to decrease water demand, including the specific types(s) of irrigation systems in place, irrigation schedules used to minimize water demand, and crop watering requirements;

- b. Any new water saving equipment installed or water saving processes adopted should be described;
- c. A status update on the success of the water loss reduction program and status of the leak detection and repair program based on the results of the water audit, including a description of actions taken to reduce the volume of water needed to supply the system;
- d. The water use education program, including any revisions or improvements made to employee training on water conservation in relation to the irrigation management plan;
- e. An evaluation of current potential water reuse options, including the potential for expansion of existing reuse practices and/or adoption of additional reuse practices;
- f. Requirements for mandatory water use reductions during water shortage emergencies and compliance with drought response and contingency ordinances or other ordinances that prohibit the use of water; and
- g. Any portions of agricultural or irrigation management plans developed to demonstrate compliance with the above items.

Mitigation Plan:

The predicted AOI resulting from the Technical Evaluation extends beyond the property boundaries in the Columbia aquifer. Given this prediction, a Mitigation Plan to address potential claims from existing well owners within the predicted area of impact is incorporated by reference in the permit.

Well Tags: Well tags will be transmitted after permit issuance.

Part II
Special Conditions

- A. **Pump Intake Setting:** Prior to initiating withdrawal from any wells on-site, documentation must be sent to DEQ noting the pump intake setting and date of installation. All well pumps must be set in accordance with 9VAC25-610-140 A 6 and Part I Operating Condition B 2

Part III
General Conditions

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610-10.

Public Comment

Relevant Regulatory Agency Comments:

Summary of VDH Comments and Actions: This facility is not a public water supply so soliciting comments from VDH was not required.

Public Involvement during Application Process:

Local and Area wide Planning Requirements: The Northampton County Administrator certified on August 5, 2020, that no local ordinances are in effect. DEQ received this certification on August 17, 2020.

Public Comment/Meetings:

The public notice was published in xxxxxx on XXX. The public comment period ran from xxxxx to xxxxx

Changes in Permit Part II Due to Public Comments

Changes in Permit Part III Due to Public Comments

Staff Findings and Recommendations

Based on review of the permit application, staff provides the following findings.

- The proposed activity is consistent with the provisions of the Ground Water Management Act of 1992, and will protect other beneficial uses.
- The proposed permit addresses minimization of the amount of groundwater needed to provide the intended beneficial use.
- The effect of the impact will not cause or contribute to significant impairment of state waters.
- This permit includes a plan to mitigate adverse impacts on existing groundwater users.

Staff recommends Groundwater Withdrawal Permit Number GW0068701 be issued as proposed.

Attachments

- 1. Technical Evaluation**
- 2. Water Conservation and Management Plan**
- 3. Mitigation Plan**
- 4. Public Comment Sheet**

Approved: _____

Director, Office of Water Supply

Date: _____

**COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY**

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: April 9, 2021

Application /Permit Number: GW0068701

Owner / Applicant Name: Mount Warren Farms, LLC

Facility / System Name: Mount Warren Farm

Facility Type: Agricultural

Facility / System Location: Northampton County

The Commonwealth of Virginia's Groundwater Withdrawal Regulations (9VAC25-610) provide that, for a permit to be issued for a new withdrawal, to expand an existing withdrawal, or reapply for a current withdrawal, a technical evaluation shall be conducted. This report documents the results of the technical evaluation conducted to meet the requirements for the issuance of a permit to withdraw groundwater within a Designated Groundwater Management Area (9VAC25-600).

This evaluation determines the:

- (1) The Area of Impact (AOI): The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.
- (2) Water Quality: The potential for the proposed withdrawal to cause salt water intrusion into any portion of any aquifers or the movement of waters of lower quality into areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource.
- (3) The Eighty Percent Drawdown (80% Drawdown): The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal.

Requested maximum withdrawal amounts:

Requested Withdrawal Amount		
Fifteen Year Lump Sum	179,500,000 gal	(32,785 average gal/d)
Annual Value	17,900,000 gal	(49,041 average gal/d)
Monthly Value	6,600,000 gal	(220,000 average gal/d)

Summary of Requested Withdrawal:

The requested groundwater withdrawal is for agricultural irrigation to support the needs of a farm that has been previously permitted (GW0068700). The facility is transitioning from a soybean to tomato crop production for the proposed permit term has requested an increased groundwater withdrawal from the surficial (Columbia) aquifer.

Requested Apportionment of Withdrawal:

DEQ Well #*	Owner Well #	Aquifer	Percent of Withdrawal
165-00569	Well #1	Columbia	33.3

165-00570	Well #2	Columbia	33.3
165-00571	Well #3	Columbia	33.3

*During the last permit term, duplicate well numbers were created for this facility. The original DEQ numbers for the three Mount Warren Farm wells were 165-00152, 165-00153, and 165-00154. Since the newer, duplicated set of numbers (165-00569, 165-00570, and 165-00571) was used in the last permit and technical evaluation and are currently representative of those wells on-site, they will continue to be used moving forward.

Production Well(s):

Identification	Location	Construction*	Pump Intake	Source Aquifer
Owner Well Name: Well #1 DEQ Well Number: 165-00569 MPID: 372916075501701	Lat: : 37° 29' 16.730" Lon: 75° 50' 16.753 Datum : NAD 83 Elevation: 35 ft/msl	Completion Date: 1978 Screens (ft/bls): 32-62 Total Depth (ft/bls): 66.8	No pump installed	Columbia
Owner Well Name: Well #2 DEQ Well Number: 165-00570 MPID: 37292007550150	Lat: : 37° 29' 20.385" Lon: 75° 50' 11.635" Datum : NAD 83 Elevation: 34 ft/msl	Completion Date: 1978 Screens (ft/bls): 35.5-50 Total Depth (ft/bls): 50 (infilled)	No pump installed	Columbia
Owner Well Name: Well #3 DEQ Well Number: 165-00571 MPID: 372923075501201	Lat: : 37° 29' 24.496" Lon: 75° 50' 11.635" Datum : NAD 83 Elevation: 34 ft/msl	Completion Date: 1978 Screens (ft/bls): 28.7-56.2 Total Depth (ft/bls): 56.2	No pump installed	Columbia

*Construction data is based on November 2018 camera surveys

Out of Service/Abandoned Well(s): None

Well(s) to be Abandoned: None

Geologic Setting:

The Mount Warren Farms wells (applicant wells) are located in Northampton County. The production wells are screened in the Columbia aquifer. The Columbia aquifer is a shallow unconfined aquifer found throughout the Virginia Coastal Plain and Eastern Shore areas. It is defined as the saturated, chiefly sandy, surficial sediments that overlie the uppermost continuous clay-silt unit¹. The Columbia aquifer primarily consists of Pleistocene sediments of the Columbia Group. The nearest USGS geologic cross section found in the USGS Scientific Investigations Report 2019-5093 is cross-section A-A' (see attached figure at the end of the report)².

¹Meng, A.A., and Harsh, J.F., 1988, Hydrogeologic Framework of the Virginia Coastal Plain: U.S. Geological Survey Professional Paper 1404-C.

² McFarland, E.R., and Beach, T.A., 2019, Hydrogeologic framework of the Virginia Eastern Shore: U.S. Geological Survey Scientific Investigations Report 2019-5093, 26 p., 13 pl., <https://doi.org/10.3133/sir20195093>.

Virginia Eastern Shore Model data:

The following table lists the locations of the applicant production wells within the Virginia Eastern Shore Model³ (VAHydroGW-ES).

VAHydroGW-ES Model Grid				
Well	Well Number	MPID	Row	Column
Well #1	165-00569	372916075501701	227	44
Well #2	165-00570	37292007550150	227	44
Well #3	165-00571	372923075501201	226	44

Hydrologic Framework:

Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Eastern Shore near the applicant wells and identify major discrepancies between regional hydrogeology and site logs interpreted by the DEQ.

The following average aquifer elevations were estimated from the VAHydroGW-ES at the model cell(s) containing the applicant production wells.

VAHydroGW-ES Average Hydrologic Unit Information		
Aquifer	Elevation (feet msl)	Depth (feet bls)
Surface	34	0
Columbia aquifer (bottom)	-28	62
Upper Yorktown-Eastover aquifer (top)	-90	124
Upper Yorktown-Eastover aquifer (bottom)	-142	176
Middle Yorktown-Eastover aquifer (top)	-171	205
Middle Yorktown-Eastover aquifer (bottom)	-208	242
Lower Yorktown-Eastover aquifer (top)	-249	283
Lower Yorktown-Eastover aquifer (bottom)	-312	346

Groundwater Characterization Program Recommendations:

DEQ has reviewed available information and made the following estimation regarding the location of the Columbia aquifer bottom for the following wells. Information reviewed in this process included camera survey GW-2 forms for all three wells in 2018 and the Hydrogeologic Framework of the Virginia Eastern Shore (USGS Scientific Investigations Report 2019-5093).

Unit	Well #1 (ft/bls)	Well #2 (ft/bls)	Well #3 (ft/bls)
Base Water Table Aquifer (Columbia)*	60	60	60
Top Upper Yorktown-Eastover	Not determined	Not determined	Not determined

*The base of the Columbia aquifer will be updated following the collection and review of geophysical log data.

³ Sanford, W.E., Pope, J.P., and Nelms, D.L., 2009, Simulation of groundwater-level and salinity changes in the Eastern Shore, Virginia: U.S. Geological Survey Scientific Investigations Report 2009-5066, 125 p.

Comparison of the Hydrogeologic Framework and Groundwater Characterization Program

Recommendations:

The bottom elevation of the Columbia aquifer provided by DEQ of 60 ft-bls is in agreement with the value obtained from the VAHydroGW-ES framework of 62 ft-bls.

Water Level Comparison:

Below water levels retrieved from the USGS regional observation network wells are compared to the simulated water levels reported in the *Virginia Eastern Shore Model (VAHydroGW-ES) 2019-2020 Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report (the 2019-2020 report) and simulation files.⁴ This comparison is made in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends.

The 2019-2020 report provides two sets of simulated potentiometric water surface elevations. The VAHydroGW-ES model is divided into three parts. The first portion of the model simulates water levels within the Eastern Shore aquifers from 1900 through 2019 based upon historically reported pumping amounts (the “*Historic Use Simulation*”). This portion of the model has been calibrated to match water levels observed in USGS regional observation network wells situated throughout the peninsula. The water levels reported in the 2019-2020 report are based upon two separate simulations, each simulation running from 2020 through 2069. The simulated pumping amount in these two simulations are based upon, 1) the average 2015-2019 reported withdrawal amount of wells in the VAHydroGW-ES model (the “*Reported Use Simulation*”) and, 2) the current (2020) maximum withdrawal amount allowed under their current permit for wells in the VAHydroGW-ES model (the “*Total Permitted Simulation*”). Both these simulations are an extension of the *Historic Use Simulation* and the water levels reported in the 2019-2020 report are the final water levels simulated at the end of the simulations (2069).

The “VAHydroGW-ES 2069 Reported Use Water Level,” reported in the tables below, is the simulated water level – 50 years from present – if all permitted pumping continued at the average 2015-2019 reported withdrawal amount for the next 50 years. The “VAHydroGW-ES 2069 Total Permitted Water Level,” reported in the tables below, is the simulated water level – 50 years from present – if all Eastern Shore permitted wells were to pump at the maximum permitted amount allowed under their current permit for the next 50 years. Finally, the “VAHydroGW-ES 2019 Historic Use Water Level,” reported in the tables below, is the water level simulated for the year 2019 in the *Historic Use Simulation*.

The nearest USGS regional observation network wells to the applicant wells, completed in the Columbia aquifer, are listed in the following table and shown in Figure 1. For the USGS regional observation network wells, average 2019 reported water levels are shown in the following tables. USGS regional observation network well 64J 30 did not have a recorded water level measurement in 2019, so the closest measurement was used instead. Simulated water levels for the VAHydroGW-ES cells containing the USGS regional observation network wells are also shown in the following tables.

Comparing the VAHydroGW-ES 2019 Historic Use Water Level with the USGS Network Well 2019 Water Level provides a method for judging the accuracy of the VAHydroGW-ES. Figures 2 and 3 show graphs of the recorded water levels from the USGS observation wells listed in the following tables. These figures also show the simulated VAHydroGW-ES *Historic Use Simulation* water levels for the model cell containing each USGS well. Observing the simulated and observed water elevations together provide a second method for assessing the accuracy of the VAHydroGW-ES in the vicinity of the applicant wells.

⁴ See *Virginia Eastern Shore Model 2019-2020 Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report and simulation files on file with the VA DEQ.

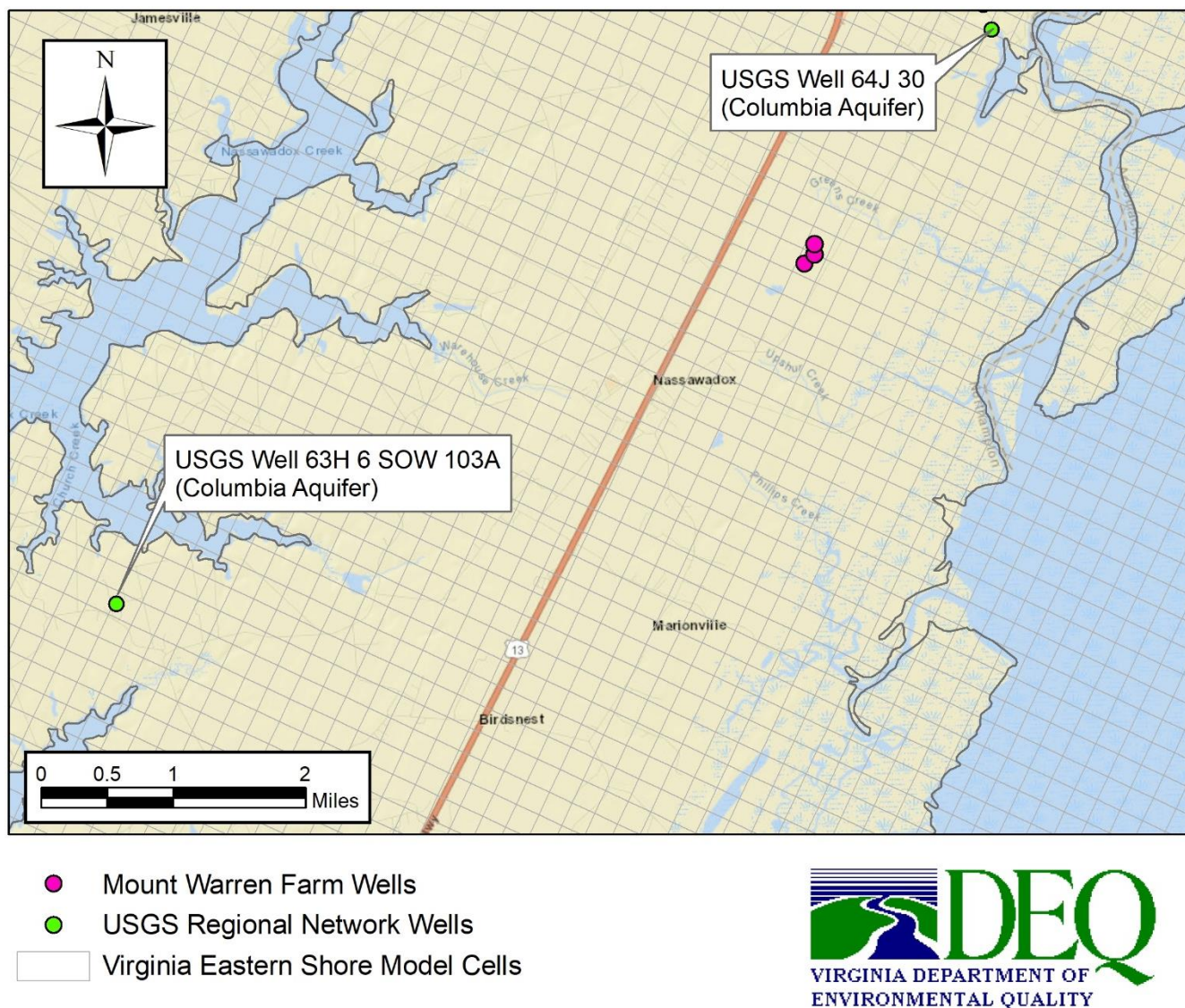


Figure 1. Nearest USGS regional observation network wells.

The Columbia VAHydroGW-ES water levels are approximately 4 to 8 feet lower than the USGS Network Well water levels observed in Well 64J 30. The Columbia VAHydroGW-ES water levels are 22 to 32 feet higher than the USGS Network Well water levels observed in Well 63H 6 SOW 103A. The large discrepancies in Columbia aquifer water levels between the VAHydroGW-ES and the USGS Network wells, especially at USGS well 63H 6 SOW 103A are noted and will be address in the next model update.

Water levels simulated by the VAHydroGW-ES do not fluctuate in the same manner because the pumping and recharge simulated in the model for any given year are averaged over the year and entered in the model as the average value for the year.

Columbia Measurements	Well 64J 30	Well 63H 6 SOW 103A
Distance from applicant wells (miles)	2.1	5.8
VAHydroGW-ES Row	215	251
VAHydroGW-ES Column	47	25

VAHydroGW-ES Land Surface Elevation (ft-msl)	9	15
USGS Well Land Surface Elevation (ft-msl)	24	17
USGS Network Well 2019 Water Level (ft-msl)	13.2*	11.6
VAHydroGW-ES 2019 Reported Use Water Level (ft-msl)	7.5	38.6
VAHydroGW-ES 2069 Reported Use Water Level (ft-msl)	7.5	13.2
VAHydroGW-ES 2069 Total Permitted Water Level (ft-msl)	7.5	13.2

*2019 USGS observation not available. Used closest recorded value to 2019 (July 30, 2018) instead.

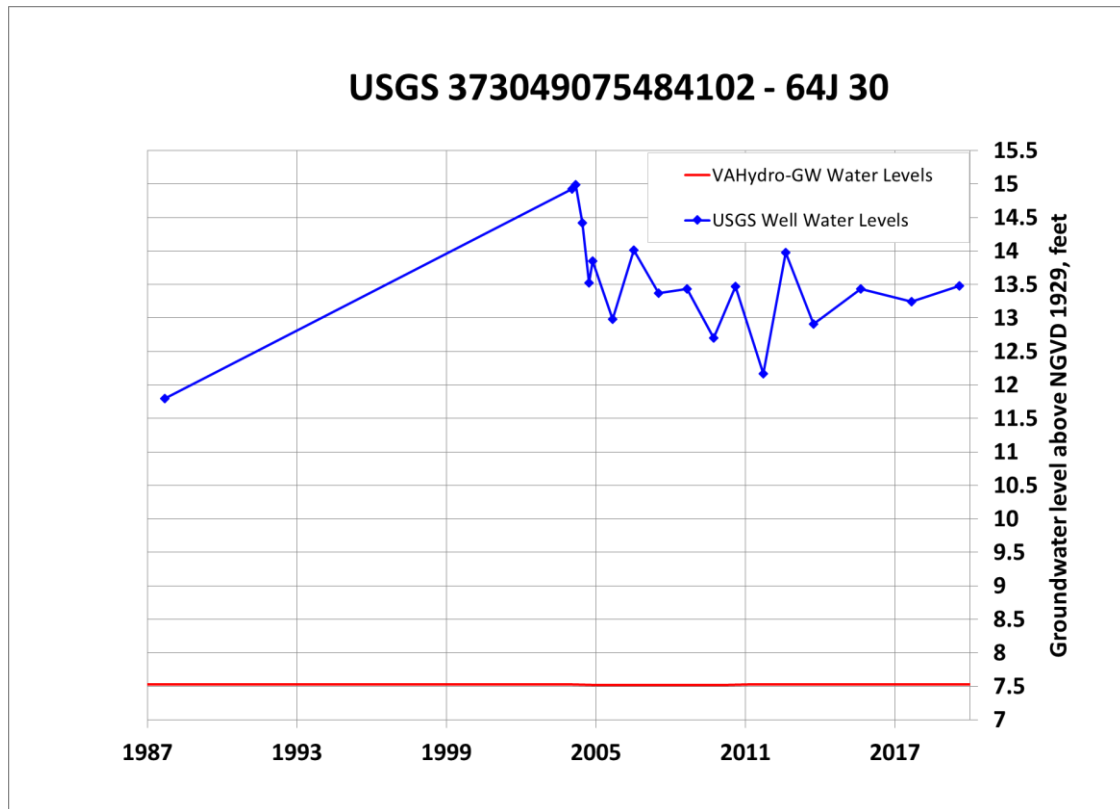


Figure 2. USGS Regional Observation Well 64J 30, Columbia aquifer water levels recorded from 1988 to present (well depth 22 ft bls, land surface 24 ft msl).

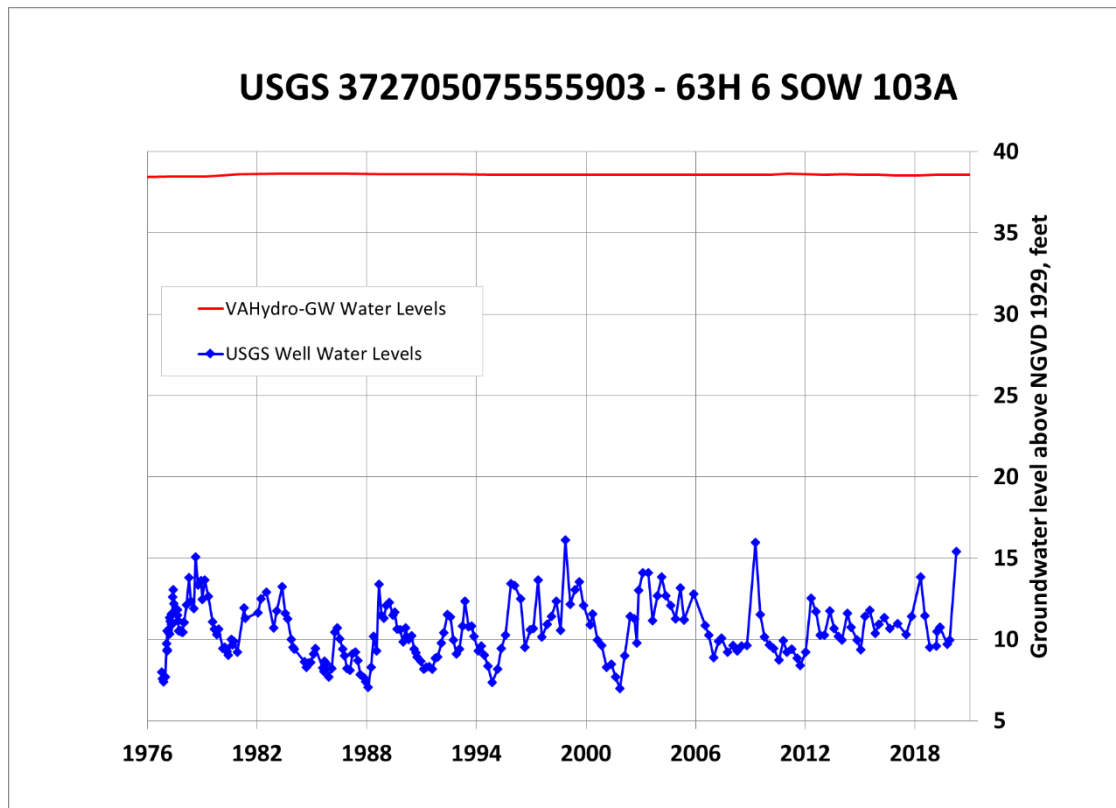


Figure 3. USGS Regional Observation Well 63H 6 SOW 103A, Columbia aquifer water levels recorded from 1977 to present (well depth 37 ft bls, land surface 17 ft msl).

Aquifer Test(s):

An aquifer test has not been conducted at this facility.

The following table provides the average hydrogeologic properties assigned to the VAHydroGW-ES cell(s) containing the applicant wells.

Virginia Eastern Shore Model Hydrogeologic Properties							
Aquifer	Top Elevation (feet msl)	Top Elevation (feet bls)	Aquifer Thickness (feet)	Horizontal Conductivity (feet/day)	Vertical Conductivity (feet/day)	Specific Storage (1/feet)	Specific Yield
Columbia	34	0	62	39	0.5	0.00001	0.15
Upper Yorktown-Eastover	-90	124	52	5	3.8	0.000004	N/A
Middle Yorktown-Eastover	-171	205	37	33	22.0	0.000004	N/A
Lower Yorktown-Eastover	-249	283	63	31	39.8	0.000004	N/A

Model Results

Evaluation of Withdrawal Impacts:

Due to the relatively small requested withdrawal rate and because an aquifer pump test was not performed, the properties from the VAHydroGW-ES were used to simulate the potential drawdown resulting from the proposed withdrawal. The drawdown in the Columbia aquifer resulting from the proposed withdrawal was calculated using a Hantush and Jacob (1955) 2D analytical simulation. The Hantush and Jacob simulation simulates drawdown in a leaky aquifer assuming constant discharge from a fully penetrating well and most closely simulates the aquifer properties observed in the Eastern Shore area.

The Columbia aquifer hydraulic conductivity and specific storage were multiplied by the aquifer thickness (62 feet) to obtain the aquifer transmissivity and storage coefficient used to simulate drawdown. The Upper Yorktown-Eastover confining unit thickness and vertical hydraulic conductivity values for the cells containing the applicant wells are 62 feet and $9.0\text{e-}5$ ft/day, respectively. These values were used to calculate a Columbia inverse leakage factor ($1/B$). For the 2D analytical simulations the following parameters were used:

Columbia Aquifer Model Input Parameters: (Hantush and Jacob 1955 solution based on aquifer parameters obtained from the VAHydroGW-ES)

Transmissivity	=	2,448.9 ft ² /day
Storage Coefficient	=	6.2×10^{-4}
$1/B$	=	2.441×10^{-5} ft ⁻¹

Withdrawal rate/Simulation Time = 50 years at 11,966,667 gallons per year (32,764 average gpd) from the Columbia aquifer divided equally among the production wells.

Area of Impact:

The AOI for an aquifer is the area where the additional drawdown due to the proposed withdrawal exceeds one foot. The results of the 2D analytical simulation with the parameters outlined in the preceding section simulate the Columbia AOI extends a maximum of approximately 0.4 miles from the production wells. This area is shown on the accompanying map.

80 % Drawdown:

Section 9 VAC 25-610-110(D)(3)(h) of the Ground Water Withdrawal Regulations⁵ states that proposed withdrawals in combination with all existing lawful withdrawals shall not lower water levels, in any **confined** aquifer below a point that represents 80% of the distance between the land surface and the top of the aquifer. Since the proposed withdrawal withdraws from the Columbia aquifer - a generally unconfined aquifer - the proposed withdrawal is not in violation of the 80% drawdown criteria.

Water Quality:

The EPA has established the National Secondary Drinking Water Regulations (NSDWRs) which are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic (such as taste, odor, or color) effects in drinking water. The EPA recommends the secondary standards to water systems – states may choose to adopt them as enforceable standards. The EPA NSDWRs specify the limit on chloride as 250 mg/L.

The VAHydroGW-ES was created "to help the Commonwealth and local water managers better plan water use and estimate future changes in water and salinity levels in response to changes in water use."⁶ Use of the model to predict future chloride concentrations results in a "general useful understanding of system behavior, but water-resource managers must be careful in trusting the accuracy of predictions at individual wells from a regional model."⁷ Further, chloride concentrations at individual wells, predicted using the regional model, should not be relied upon to predict actual concentrations at those locations.

⁵ Refer to http://www.deq.virginia.gov/gwpermitting/pdf/gwwithdrawal_regs.pdf, pg. 15

⁶ Sanford, W.E., Pope, J.P., and Nelms, D.L., 2009, Simulation of groundwater-level and salinity changes in the Eastern Shore, Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5066, 125 p.

⁷ Sanford, W.E. and Pope, J.P., 2009, Current challenges using models to forecast seawater intrusion: lessons from the Eastern Shore of Virginia, USA. Hydrogeology Journal (2009), Volume: 18, Issue: 1, p: 73-93

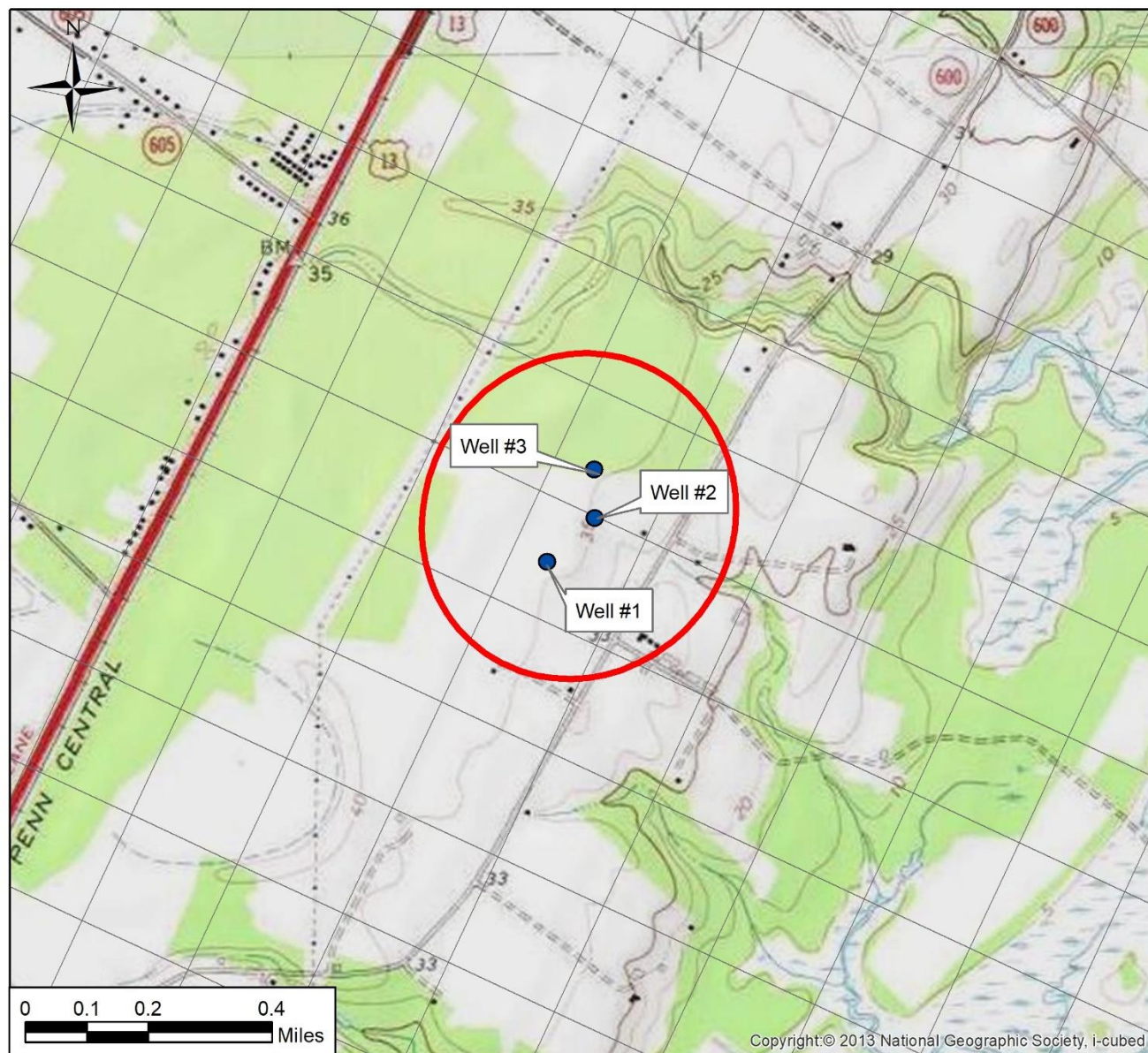
The potential for adverse changes to water quality due to the requested withdrawal was evaluated using transient, density-dependent, SEAWAT simulations using the VAHydroGW-ES. Two simulations were executed – one simulation without the proposed withdrawal included and a second with the proposed withdrawal included. Both simulations were executed for 50 years. Both used the 2020 total permitted stresses, concentrations, and heads as starting conditions. In an effort to simulate the long-term effects on water quality due to the proposed withdrawal, the total annual amount of 11,966,667 gallons per year (32,764 average gallons per day) and was used for the duration of the second simulation. The two simulations were compared to evaluate the potential for adverse changes to water quality. The results indicated that no model cells simulate an increase in chloride concentration greater than 50 mg/L due to the proposed withdrawal. Therefore, the VAHydroGW-ES model results do not indicate the potential for reduced water quality as a result of the proposed withdrawal.

Conclusion:

The withdrawal requested by Mount Warren Farms, LLC for the Mount Warren Farm withdrawal satisfies the technical evaluation criteria for permit issuance. The AOI for the Columbia aquifer is shown in the following map. There are no existing permitted wells located within the applicant's AOI.

Mount Warren Farm

Area of Impact - Columbia (Water Table) Aquifer



Columbia Aquifer Area of Impact



VAHydroGW-ES Model Cells

Simulated drawdown at or exceeding one foot in the Columbia aquifer resulting from a 2-dimensional analytical simulation (Hantush-Jacob) of 50 years at 11,966,667 gallons per year from the Columbia aquifer. Maximum radius of one-foot drawdown (Area of Impact) occurs 0.4 feet from the pumping center.

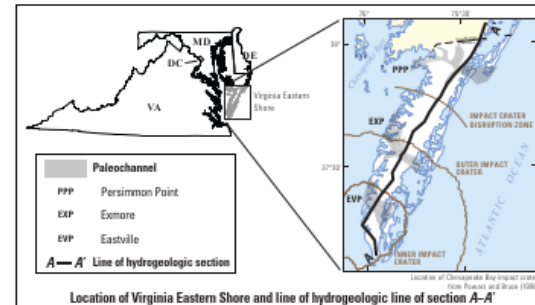
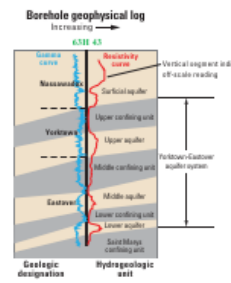
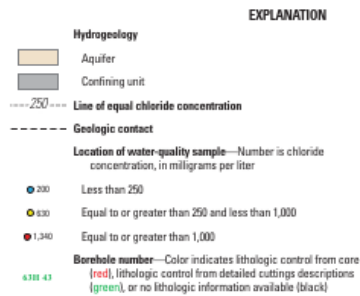
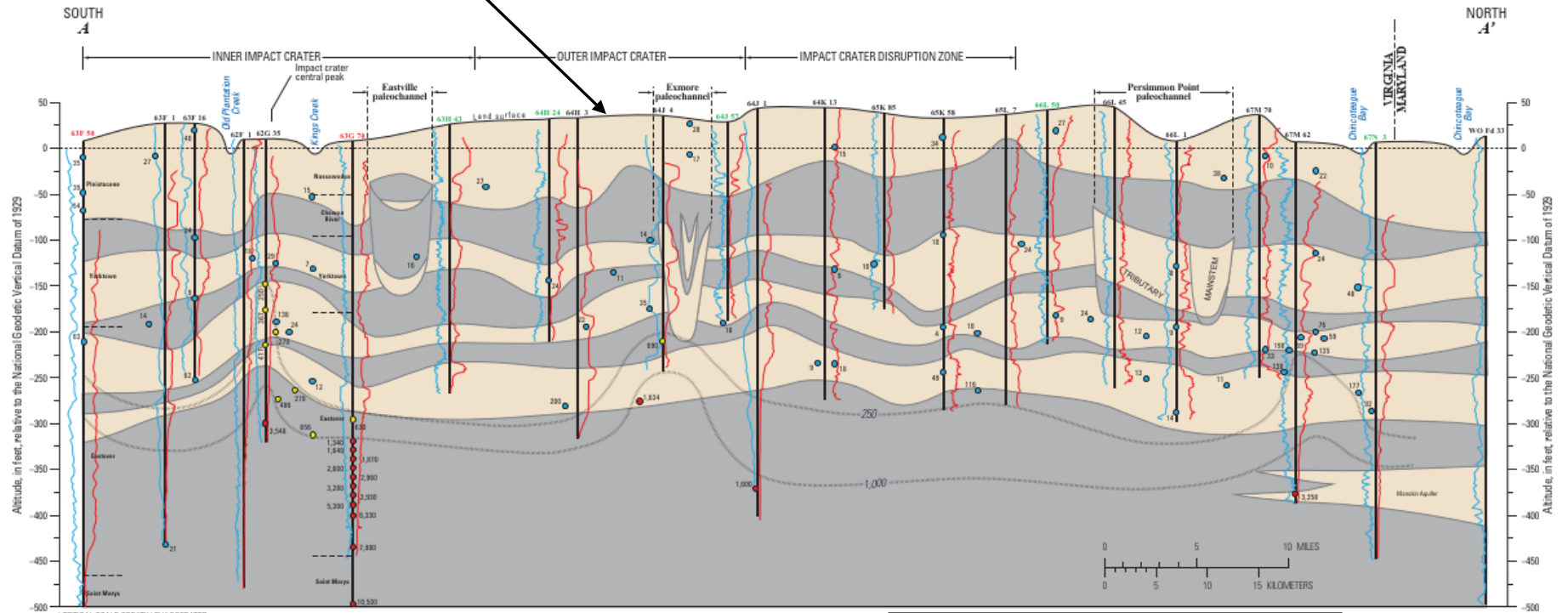
Technical Evaluation performed
by Aquaveo, LLC for the Virginia
DEQ, Office of Surface and
Ground Water Supply Planning
April 28, 2021



Approximate location of
applicant wells, which are
east of this cross-section

Prepared in cooperation with the
Virginia Department of Environmental Quality

Scientific Investigations Report 2019-5093
Plate 2 of 13



Hydrogeologic Section through the Virginia Eastern Shore

By
E. Randolph McFarland and Todd A. Beach
2019

Cross-Section A-A' from USGS Scientific Investigations Report 2019-5093 (2019).



Section 10. Ground water Conservation and Management Plan

**Mount Warren Farms, LLC.
Mount Warren Farm
Exmore, Northampton Virginia**

October 2020

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1.0 GENERAL INFORMATION

The Mount Warren Farm, herein referred to as the “Farm”, is an agricultural farm primarily used to grow tomatoes. This farm is located within the town of Exmore, Northampton County Virginia. The Farm utilizes drip irrigation.

Typical irrigation needs at the Farm require consumption of varying amounts of ground water from its three-well system affected by the time of year, amount of precipitation, and the growth stage of the crop. These wells are located on the Farm property. Because this property is located within the Eastern Shore Ground water Management Area – as defined by the Virginia Department of Environmental Quality [VDEQ] – a Water Conservation and Management Plan has been prepared in accordance with the Ground Water Management Act of 1992, Chapter 25 (§62.1-254 et seq.) of Title 62.1 of the Code of Virginia. The purpose of this document is to analyze water supply and demand issues facing the Farm and develop a reasoned and justifiable response for water conservation and management. This document is intended to help guide the management of the Farm, who are responsible for the operation and policy management decisions. Lastly, this document will meet the Ground Water Withdrawal Permit requirement for a water conservation and management plan.

Water conservation measures are those physical facilities, equipment, or devices utilized with certain methods, techniques, policies, practices, and procedures, which reduce water consumption, improve water use efficiency, reduce water loss or waste, increase water recycling or reuse and ultimately result in a reduction of water demand. Water management consists of a plan to implement water conservation measures. This Water Conservation and Management Plan, referred to herein as the “Plan” includes identification of water demand and water source and then provide guidance to implement water management and conservation measures.

2.0 WATER DEMAND

Water demand at this Farm is primarily associated with tomato crop irrigation. Tomato plants require a precise amount of water. If an improper amount is applied to the crop, either too much or too little, plant health will be significantly affected. The amount of water needed is monitored on a daily basis through the use of computerized measurements, visual inspections of the crop, and knowledge of the crop's water needs at the different growth stages. A much smaller amount of groundwater is used to fill pesticide sprayer vehicles.

The Farm has the capacity to operate 64.0 gross acres of drip irrigation area requiring groundwater. Irrigation water is withdrawn directly from the groundwater wells. Irrigation water at this Farm is administered to the root zone of the plant through the use of drip hoses. The drip emitters are placed within raised earthen beds that are covered by plastic mulch. Plastic mulch reduces water loss by controlling soil temperature, minimizing weed growth, and capturing potential evaporation from the soil. Together these practices reduce water consumption by 50% to 75% when compared to irrigating with a sprinkler system. Due to the use of these practices, there are limited additional opportunities to conserve water. All water containing appurtenances are drained of water for winterization.

Water used for pesticide application must be measured and used in accordance with manufacturer's recommended dilution and application rates. Therefore, it is unlikely that more water can be conserved during the spray application process.

3.0 WATER SUPPLY

The following section presents a general overview of water resources available to the Farm. The Farm is not tied to any municipal water supply. There are three wells at the Farm that currently supply ground water of an adequate quality and quantity.

This region receives approximately 42 inches of precipitation per year. This precipitation does not occur on-demand, and droughts of 1-2 months are not infrequent during the summer growing season. Due to the climate of the Eastern Shore of Virginia, tomatoes can only be grown during approximately half of the year. Therefore, even if the owner was to invest in a stormwater pond, catchment ditches and the like, this additional cost does not ensure a reliable water source for the growth of tomatoes during each year of the permit term. Further, any investment in additional infrastructure on the property reduces the farmable area available to a lessee, possibly reducing the value of the (relatively small) property to the owner.

There are no surface water resources, rivers or lakes available. The headwaters of Green and Upshur Creeks are more than 1,000 feet from the property boundaries of Mount Warren Farm. There are several reasons that these creeks were deemed unacceptable for use as the source of irrigation water on the farm. First, there are virtually no tomato farms on the Eastern Shore of Virginia that utilize unimpounded creeks for an irrigation water supply, likely for good reason. The water quantity from these creeks will likely be seasonal or transient in nature and be unable to reliably serve the 6.5 million gallons per month needed for the subject beneficial use. Source water reliability is key to the growth of tomato crops as a water deficit in the plants for only a few days can dramatically effect yields. Further, given that the property does not have direct access to these creeks of unknown reliability, easements would have to be agreed upon with the owners of the properties that are adjacent to these creeks and those whose properties would be traversed by the pipeline carrying the withdrawn water. There is no guarantee that these property owners would grant such access to their land. Lastly, the utilization of the waters of these creeks at rates indicated in this application may allow for the potential for the overuse of the creeks, negatively impacting wetlands and wildlife that depend on the creeks.

Lastly, effort exuded from the pursuit of these surface water sources in order to supply a fraction of the water needed by the farm would have represented a massive cost for an unlikely and partial benefit. The groundwater wells on the property represent the obvious choice.

4.0 WATER CONSERVATION MEASURES AND WATER LOSS REDUCTION PROGRAM

The following conservation measures will be implemented with regard to the water supply including ground water from the Farm's wells.

- Crops will be grown using the plasticulture farming method to minimize soil evaporation losses and transpiration losses from weeds.
- There will be no unnecessary ground water withdrawals. Water withdrawn under the Farm's Ground Water Withdrawal Permit is withdrawn to irrigate crops and for pesticide spray application. The wells and irrigation system will be manually controlled.
- Farm management will review water use on a monthly basis and will implement changes when identified:
 - The Management maintains an electronic database to record, monitor, and review the required monthly well meter readings.
- Weekly inspections for surface or subsurface leaks will be conducted for all well heads, pump station, meters, main lines, and drip lines while the facility is in production. Subsurface leaks will be determined where the ground surface is abnormally saturated or where blowouts occur.
- *Water Use Education Program:* Employees will receive instruction as to the importance of efficient water use and conservation methods annually during their orientation. This will include an introduction to the aquifer systems available on the shore, the water requirements of different plants, the subject groundwater withdrawal permit and its requirements and this Water Conservation & Management Plan. Only one or two employees will be tasked with controlling water use on-site. These employees will oversee well use, pump station irrigation practices, and drip irrigation installation and maintenance.
- *Water Reuse Evaluation:* Tomato plants require a precise amount of water. If an improper amount is applied to the crop, either too much or too little, plant health will be significantly affected. Since no excess water is applied to the crop there is no opportunity to reuse water. Further, Water used for pesticide application must be measured and used in accordance with manufacturer's recommended dilution and application rates. Therefore, it is unlikely that more water can be conserved during the spray application process.
- Any leak discovered in the water supply system will be repaired as soon as is practical or will be bypassed so as to minimize loss of water.

- Mandatory water use restrictions will be implemented during water shortage emergencies declared by the local governing body, the Director of DEQ, or the Governor. Non-essential uses of water will be restricted. In addition, Farm personnel will be prohibited from general washing of buildings, paved surfaces, or non-essential equipment. The Farm will comply with penalties for demonstrated failure to comply with mandatory water use restrictions.

According to the Northampton County Water Supply Plan, drought stages are identified by Drought Response and Contingency Plan (DRCP) stages. There are 4 stages: Normal, Drought Watch, Drought Warning, and Drought Emergency. The first three stages place no mandatory restrictions on water users. Only under a Drought Emergency are mandatory restrictions imposed on non-essential water uses by public water supply systems. Given that Mount Warren Farm is not, and will not be a public water supply, no restrictions are imposed on the Farm.

The goal of the water use restrictions is stated to be a reduction of water use by 10 to 15 percent or more. Mount Warren Farm will voluntarily attempt to reduce water use by 10 percent during a Drought Emergency by reducing well run times by 10 percent.

- *Water Conservation:* Water conservation efforts shall be followed in order to preserve the resource and right to withdraw water from the resource.
- The facility has a vested financial interest in saving water. This is because water use at this facility requires electricity to run the well pump, booster pumps, electric valves etc. Furthermore, water use contributes well pump wear and eventual failure. Because electricity and failing appurtenances cost the facility money, staff is consistently mindful and proactive when it comes to unintentional water use at the facility.
- *Water Loss Reduction Program:* Attached to this plan as Appendix A is the Operational Plan Inspection Report which will be used to fulfill the need for a facility groundwater audit, leak detection and repair program and will act as a scheduling implement for inspections of water using devices and areas. The Operational Plan for the conservation of water at the facility is as follows:
 - 1) Bi-annually the Operational Plan Inspection Report will be filled out by site personnel and this report will include, but not be limited to, the water used during the months assessed compared to crop stages, etc., leak inspection/detection, leak repair schedules, water use area/device inspections and any high volume water consumption by the facility.
 - 2) This plan will act as a scheduling tool and report form for the facility to refer to in order to properly document leaks and have them repaired in a timely fashion. This tool

will be formally filed twice a year, but will be updated as leaks and repairs occur. The inspection report should comment on the previous report's findings and set dates, deadlines and schedules for repairing leaks. Following leak repair, the latest report will be updated to indicate the repair.

3) A groundwater audit will be conducted annually during the first two years of the permit cycle. Primarily, this will consist of the comparison of the total groundwater withdrawn month to month and year to year when compared with the crop planted, stage of crop, etc. and in comparison to the 15 year lump-sum permitted groundwater allocation.

4) Photographs can be included in the report in order to track the progression of a device which may be failing or a repair in progress.

APPENDIX A – WATER LOSS REDUCTION PROGRAM OPERATIONAL PLAN AND SCHEDULE

MITIGATION PLAN

DEQ GROUNDWATER WITHDRAWAL PERMIT NO. GW0068701

OWNER NAME: John Payne

FACILITY NAME: Mount Warren Farm

LOCATION: Exmore, Virginia

INTRODUCTION

On 8/1/18, John Payne submitted a Groundwater Withdrawal Permit Application to the Virginia Department of Environmental Quality (DEQ) to withdraw groundwater. Groundwater withdrawals associated with this permit will be utilized to provide water to a poultry growing operation.

The purpose of this Mitigation Plan is to provide existing groundwater users a method to resolve claims that may arise due to the impact of the withdrawal from the Mount Warren Farm well field. Predicted drawdown of water levels due to the withdrawal(s) from the Upper Yorktown Eastover and Columbia aquifers are shown in the attached maps(s) provided by the DEQ.

Modeled impacts, as shown on the attached maps, extend beyond the boundary of the Mount Warren Farm facility. Due to these findings, John Payne recognizes that there will be a rebuttable presumption that water level declines that cause adverse impacts to existing groundwater users within the area of impact are due to this withdrawal. Claims may be made by groundwater users outside this area; however, there is a rebuttable presumption that John Payne has not caused the adverse impact. John Payne proposes this plan to mitigate impacts to existing users and excludes impacts to wells constructed after the effective date of this permit.

CLAIMANT REQUIREMENTS

To initiate a claim, the claimant must provide written notification of the claim to the following address:

Contact Name	<u>John Payne</u>
Title	<u>Managing Member</u>
Permittee Name	<u>John Payne</u>
Address	<u>PO Box 12809</u>
City, State Zip Code	<u>Norfolk, VA 23541</u>

The claim must include the following information: (a) a deed or other available evidence that the claimant is the owner of the well and the well was constructed and operated prior to the effective date of the permit; (b) all available information related to well construction, water levels, historic yield, water quality, and the exact location of the well sufficient to allow John Payne to locate the well on the claimant's property; (c) the reasons the claimant believes that the Mount Warren Farm withdrawal has caused an adverse impact on the claimants well(s).

CLAIM RESOLUTION

John Payne will review any claim within **five (5) business days**. If John Payne determines that no rebuttal will be made and accepts the claim as valid, John Payne will so notify the claimant and will implement mitigation within **thirty (30) business days**. If the claim is not accepted as valid, John Payne will notify the claimant that (a) the claim is denied **or** (b) that additional documentation from the claimant is required in order to evaluate the claim. Within **fifteen (15) business days** of receiving additional documentation from the claimant, John Payne will notify the claimant (a) that John Payne agrees to mitigate adverse impacts or (b) the claim is denied. If the claim is denied, the claimant will be notified that the claimant may request the claim be evaluated by a three (3) member committee. This committee will consist of one (1) representative selected by John Payne, one (1) representative selected by the claimant, and one (1) representative mutually agreed upon by the claimant and John Payne.

Any claimant requesting that a claim be evaluated by the committee should provide the name and address of their representative to John Payne. Within **five (5) business days** of receipt of such notification, John Payne will notify the claimant and claimant's representative of the identity of John Payne representative and instruct the representatives to select a third representative within **ten (10) business days**. Representatives should be a professional engineer or hydrogeologist with experience in the field of groundwater hydrology. John Payne agrees to reimburse the members of the committee for reasonable time spent, at a rate prevailing in the area for experts in the above listed fields, and for direct costs incurred in administering the plan. The claimant may, at his or her option, choose to provide the reimbursement for the member of the committee selected by the claimant and up to half of the reimbursement for the mutual representative.

Within **ten (10) business days** of selection of the third representative, the committee will establish a **reasonable deadline** for submission of all documentation it needs to evaluate the claim. Both the claimant and John Payne will abide by this deadline.

Within **fifteen (15) business days** of receipt of documentation, the committee will evaluate the claim and reach a decision by majority vote. The committee will notify the claimant regarding its decision to (a) deny or (b) approve the claim. If the claim is approved, John Payne will mitigate the adverse impacts within **thirty (30) business days** of making the decision or as soon as practical. If the claim is denied by the committee, John Payne may seek reimbursement from the claimant for the claimant's committee representative and one half of the 3rd

representative on the committee.

If a claimant within the indicated area of impact indicates that they are out of water, John Payne will accept the responsibility of providing water for human consumptive needs within **seventy-two (72) hours** and to cover the claim review period. John Payne reserves the right to recover the cost of such emergency supply if the claim is denied by John Payne or found to be fraudulent or frivolous. If John Payne denies a claim and the claimant elects to proceed with the three (3) member committee, John Payne will continue the emergency water supply at the claimants request during the committee's deliberations, but reserves the right to recover the total costs of emergency water supply in the case that the committee upholds the denial of the claim. Similarly, John Payne reserves the right to recover costs associated with the claim process if a claim is found to be fraudulent or frivolous.

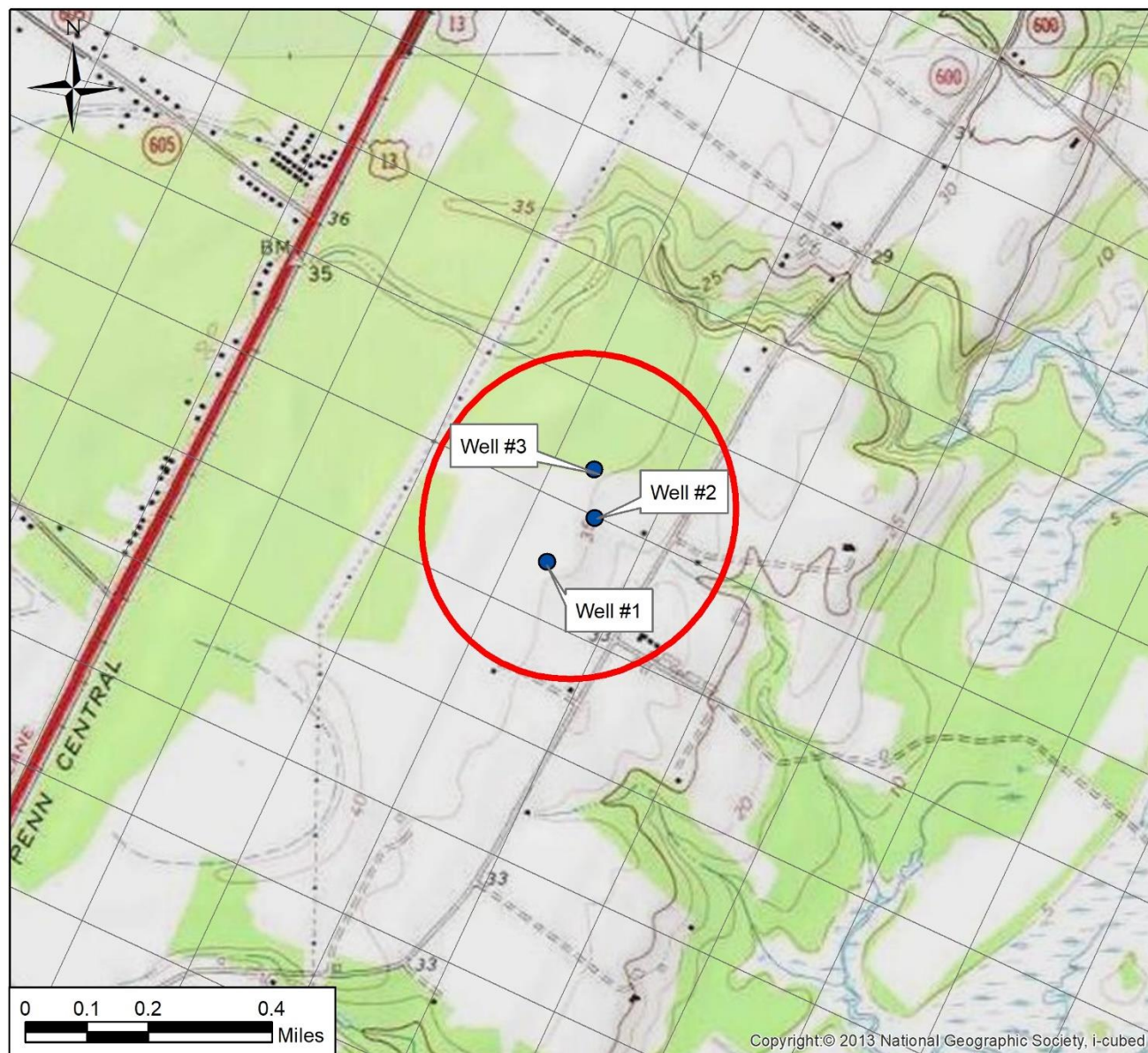
If it is determined by the committee or shown to the committee's satisfaction that a well operating under a mitigation plan similar to John Payne's Plan other than those owned and operated by John Payne has contributed to the claimed adverse impact, John Payne's share of the costs associated with mitigation will be allocated in proportion to its share of the impact. Such a determination shall be made by the committee after notification of the third party well owner, giving the third party well owner opportunity to participate in the proceedings of the committee.

PLAN ADMINISTRATION

Nothing in the Plan shall be construed to prevent the Department of Environmental Quality Staff from providing information needed for resolution of claims by the committee.

Mount Warren Farm

Area of Impact - Columbia (Water Table) Aquifer



Columbia Aquifer Area of Impact



VAHydroGW-ES Model Cells

Simulated drawdown at or exceeding one foot in the Columbia aquifer resulting from a 2-dimensional analytical simulation (Hantush-Jacob) of 50 years at 11,966,667 gallons per year from the Columbia aquifer. Maximum radius of one-foot drawdown (Area of Impact) occurs 0.4 feet from the pumping center.

Technical Evaluation performed
by Aquaveo, LLC for the Virginia
DEQ, Office of Surface and
Ground Water Supply Planning
April 28, 2021

